Comparison of Observed AMSU/HSB Brightness Temperatures with Calculated from Radiosondes for July 4, 2002

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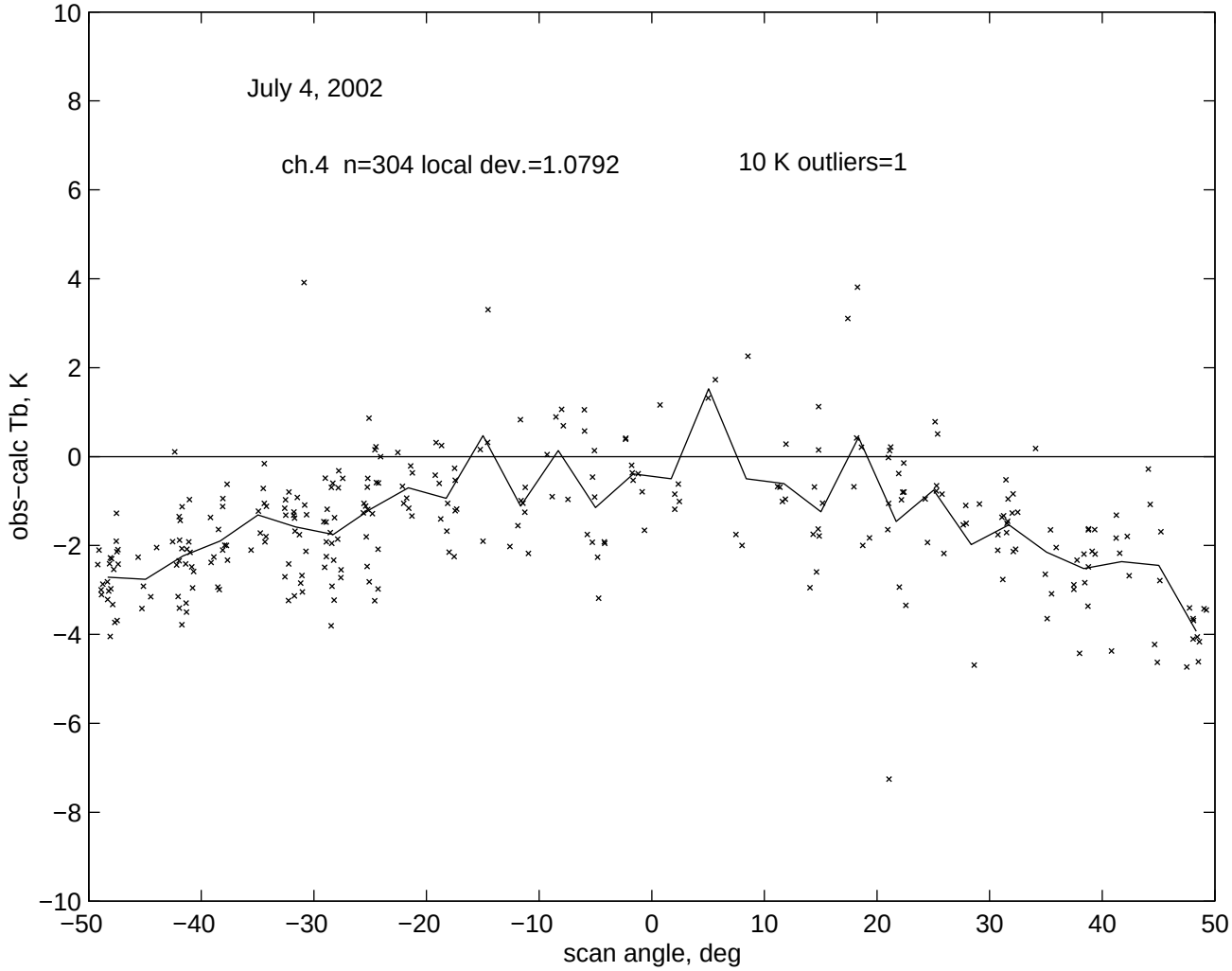
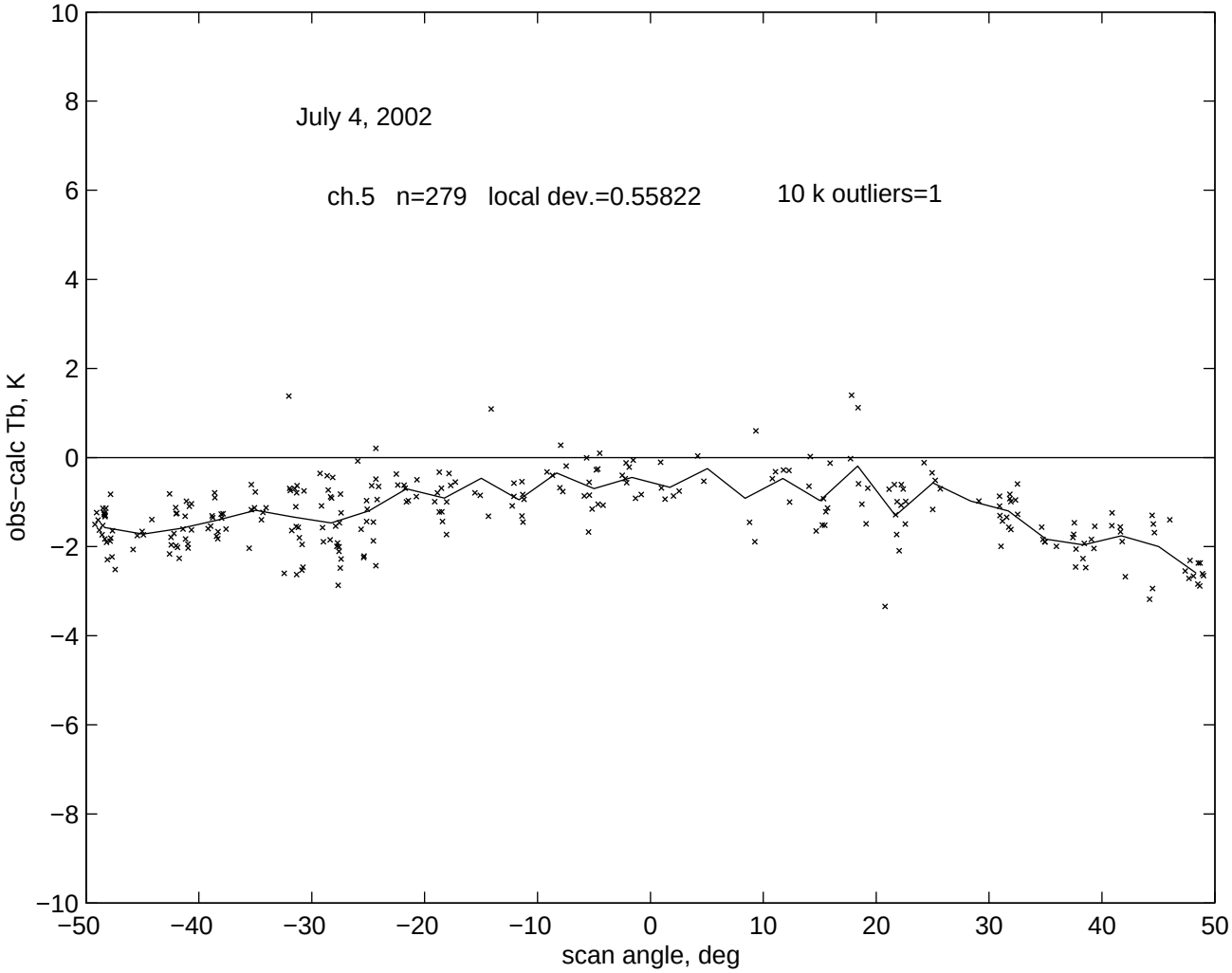
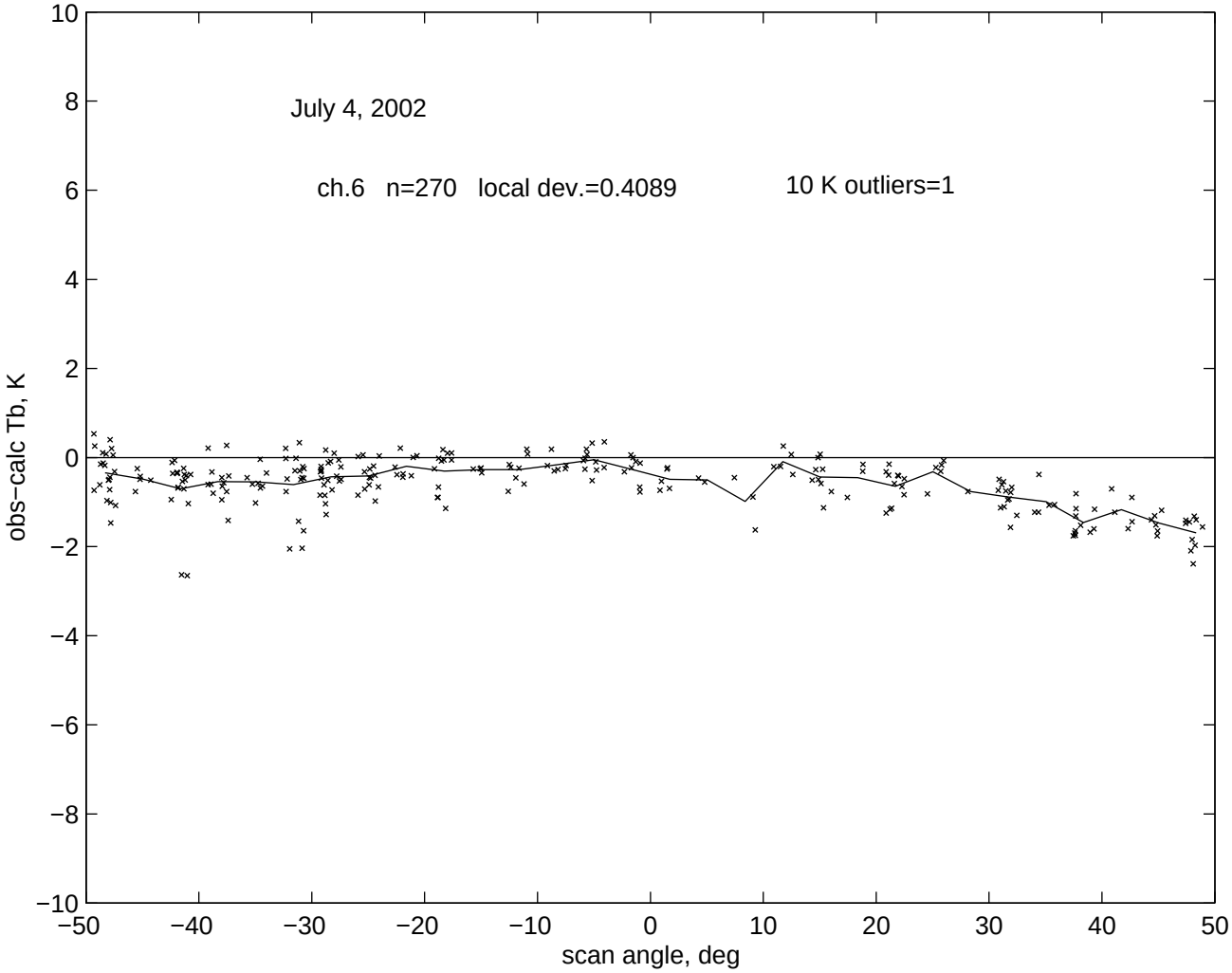
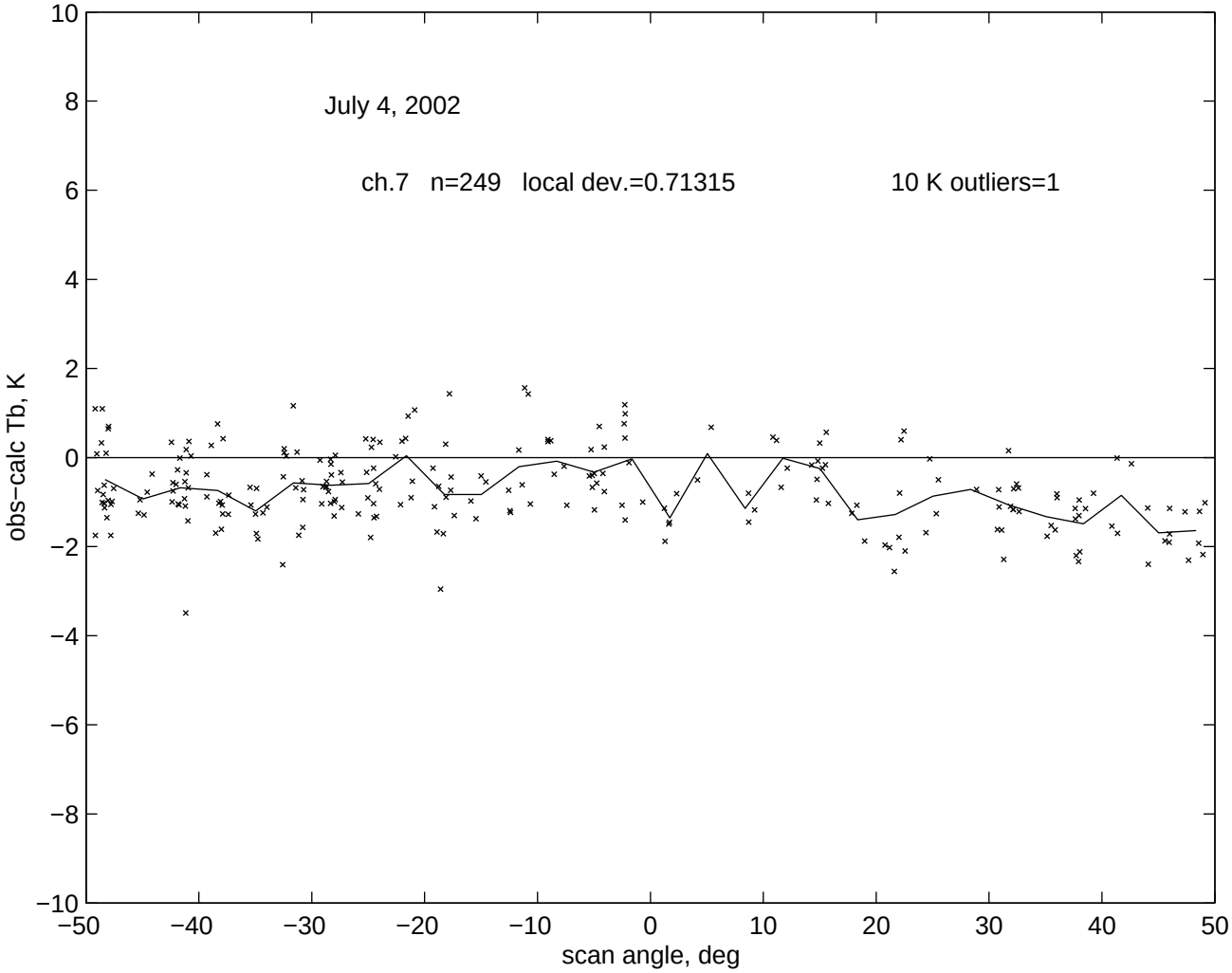
The co-located PREPQC radiosonde matchups from July 4, 2002 were used to calculate brightness temperatures from microwave channels 4-9 (52.8 - 57.3 GHz) and 17-20 (150, 183 +-1, +-3, +-7 GHz). The forward calculation was very similar to that described in my TGRS-Aqua-issue preprint (where NOAA-15 data was used), except that sidelobe corrections have not been made here, and the differences are plotted vs. scan angle instead of incidence angle. The window channels were not done because of surface model issues, and the channels peaking higher in the atmosphere than ch.9 (at 90 hPa) had fewer radiosondes that extended to the required high altitudes. In the plots, the "local deviation" is the standard deviation about the local mean (shown by the solid line) at each scan angle. Differences larger than 10 K are not used in the statistics, but the number of these outliers is noted.

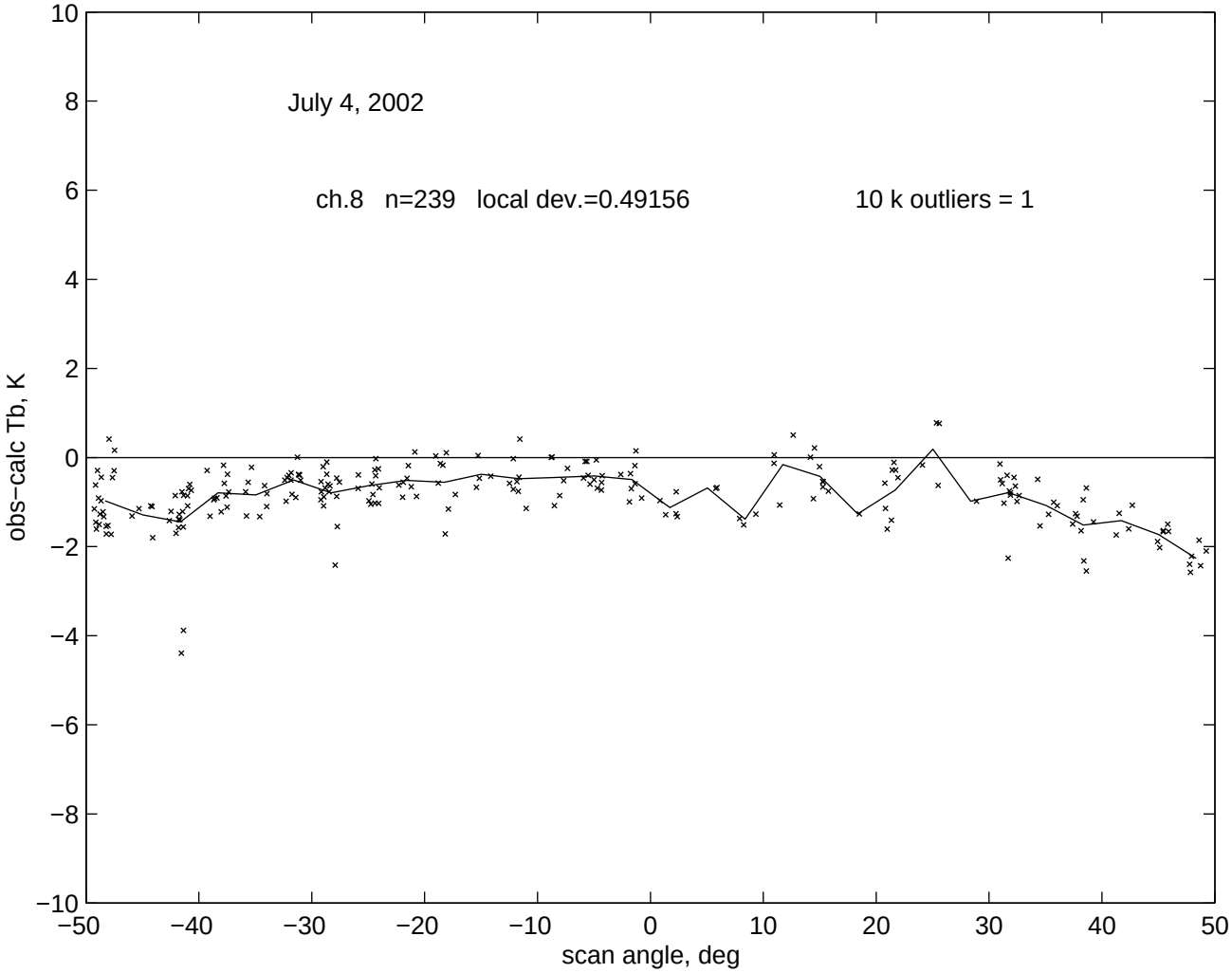
The water vapor channels 17-20 have deviations much larger than the oxygen-band channels 4-9. To some extent, it was anticipated that a definitive comparison of water-vapor channels would have to use dedicated launches rather than the standard raobs. Analysis of the dependence of errors on time difference (max. 3 hr. here) has not yet been done. Within the matchup golfball, the HSB footprint closest to the raob was selected for the comparison, and only one matchup was used per raob.

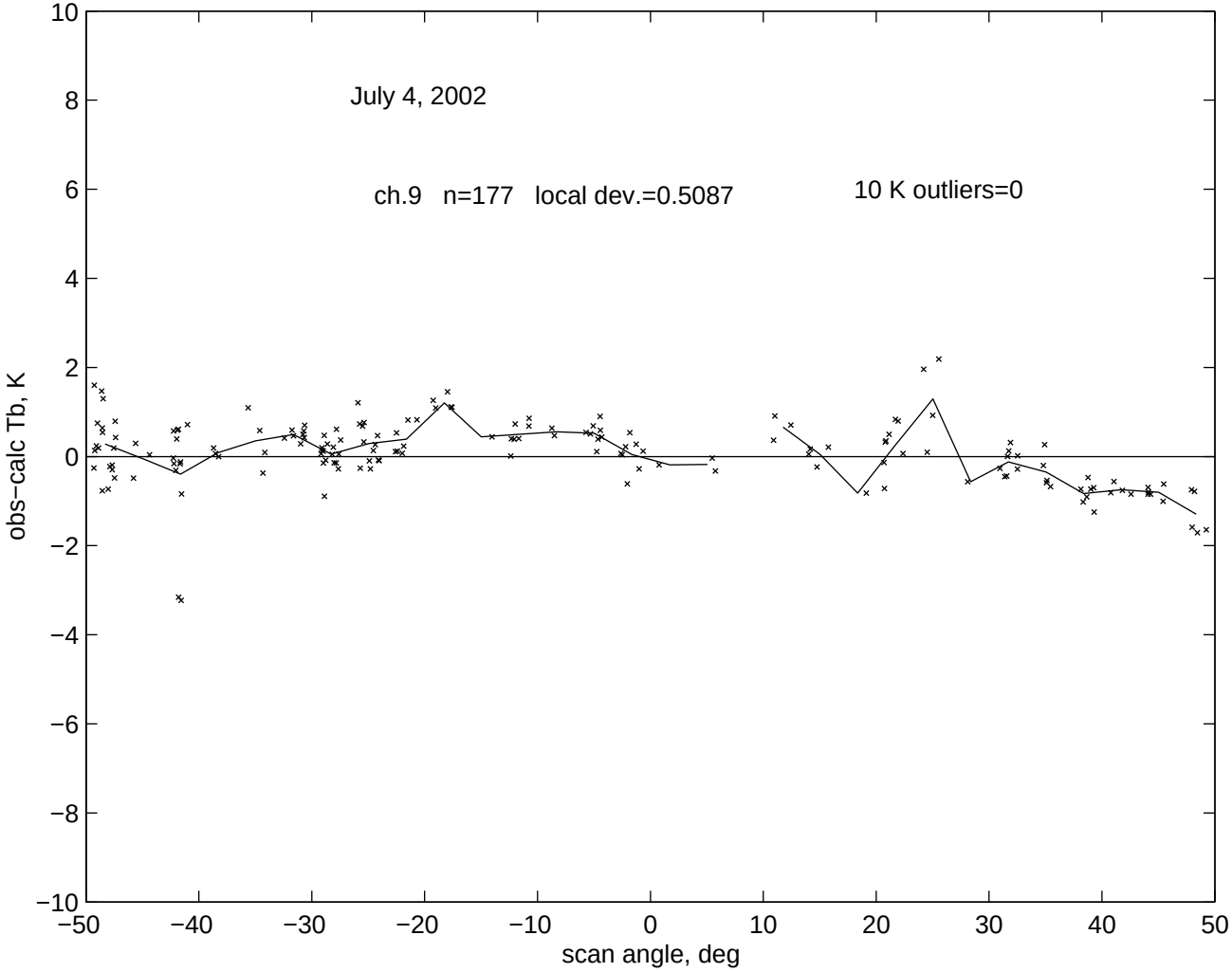

July 4, 2002
ch.4 n=304 local dev.=1.0792
10 K outliers=1
obs−calc Tb, K
scan angle, deg
10
8
6
4
2
0
−2
−4
−6
−8
−10
−50
−40
−30
−20
−10
0
10
20
30
40
50

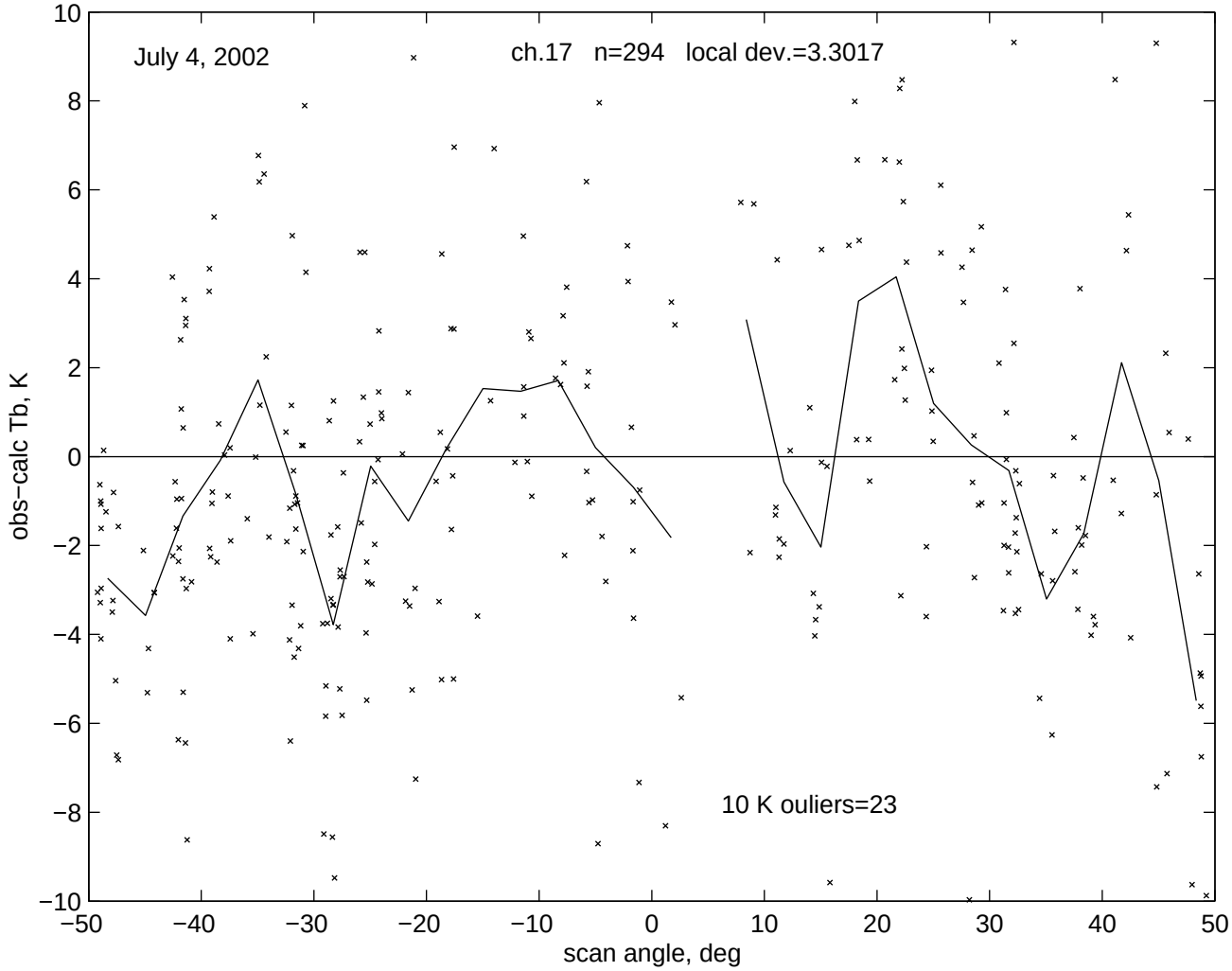

July 4, 2002
ch.5 n=279 local dev.=0.55822
10 k outliers=1
obs−calc Tb, K
scan angle, deg
10
8
6
4
2
0
−2
−4
−6
−8
−10
−50
−40
−30
−20
−10
0
10
20
30
40
50

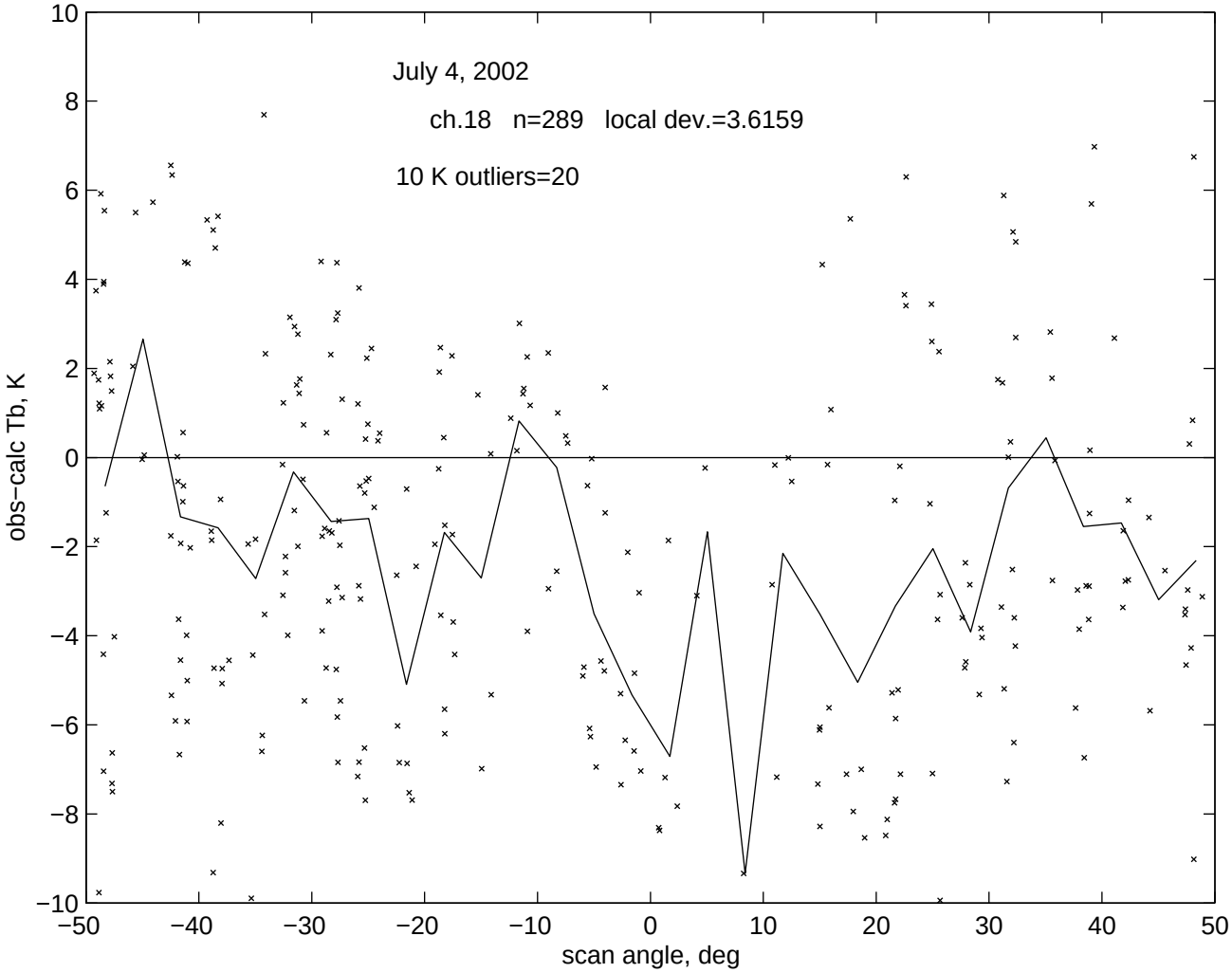

July 4, 2002
ch.6 n=270 local dev.=0.4089
10 K outliers=1
obs−calc Tb, K
scan angle, deg
10
8
6
4
2
0
−2
−4
−6
−8
−10
−50
−40
−30
−20
−10
0
10
20
30
40
50

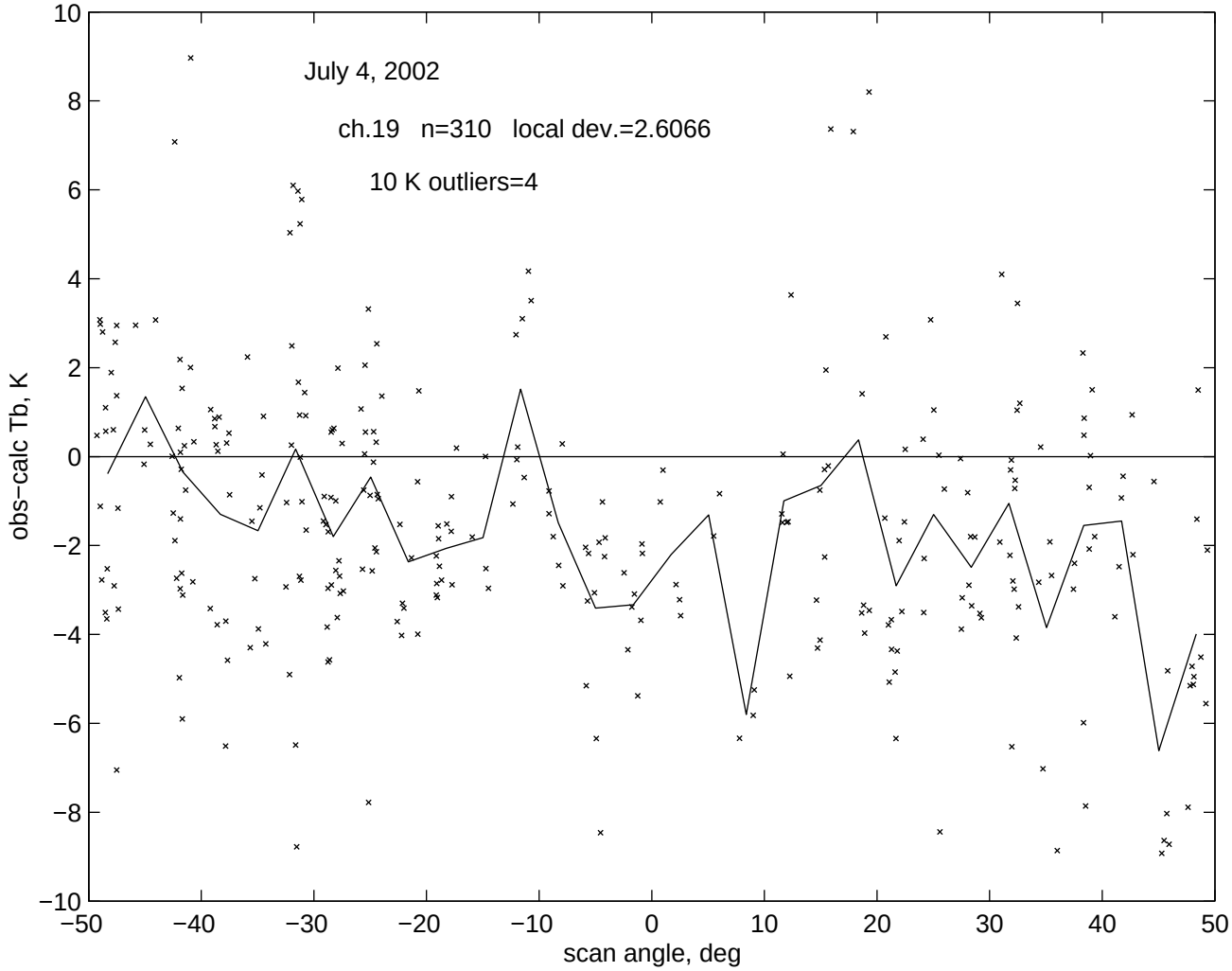

July 4, 2002
ch.7 n=249 local dev.=0.71315
10 K outliers=1
obs−calc Tb, K
scan angle, deg
10
8
6
4
2
0
−2
−4
−6
−8
−10
−50
−40
−30
−20
−10
0
10
20
30
40
50

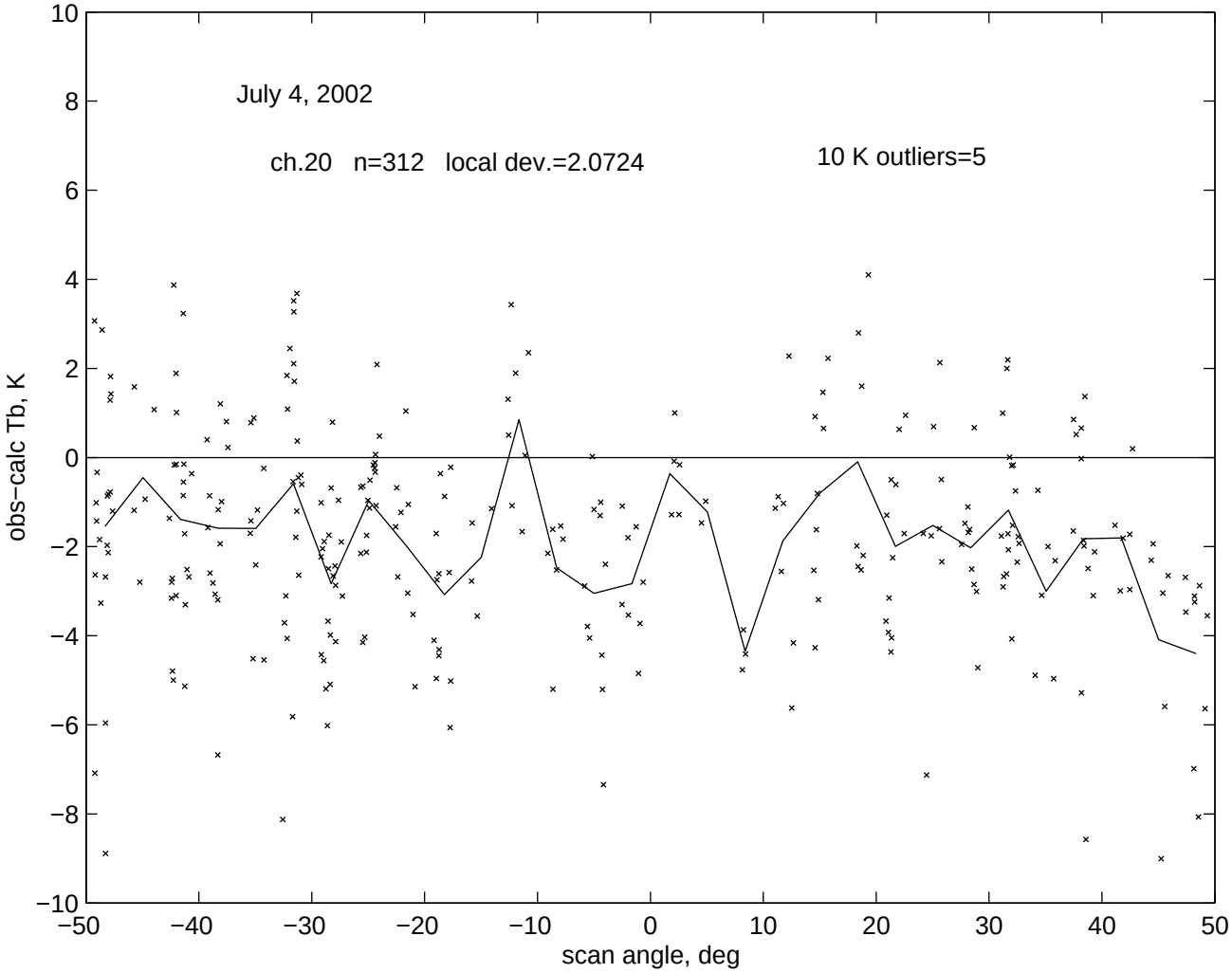

July 4, 2002
ch.8 n=239 local dev.=0.49156
10 k outliers = 1
obs−calc Tb, K
scan angle, deg
10
8
6
4
2
0
−2
−4
−6
−8
−10
−50
−40
−30
−20
−10
0
10
20
30
40
50


July 4, 2002
ch.9 n=177 local dev.=0.5087
10 K outliers=0
obs−calc Tb, K
scan angle, deg
10
8
6
4
2
0
−2
−4
−6
−8
−10
−50
−40
−30
−20
−10
0
10
20
30
40
50


July 4, 2002
ch.17 n=294 local dev.=3.3017
10 K ouliers=23
obs−calc Tb, K
scan angle, deg
10
8
6
4
2
0
−2
−4
−6
−8
−10
−50
−40
−30
−20
−10
0
10
20
30
40
50


July 4, 2002
ch.18 n=289 local dev.=3.6159
10 K outliers=20
obs−calc Tb, K
scan angle, deg
10
8
6
4
2
0
−2
−4
−6
−8
−10
−50
−40
−30
−20
−10
0
10
20
30
40
50


July 4, 2002
ch.19 n=310 local dev.=2.6066
10 K outliers=4
obs−calc Tb, K
scan angle, deg
10
8
6
4
2
0
−2
−4
−6
−8
−10
−50
−40
−30
−20
−10
0
10
20
30
40
50


July 4, 2002
ch.20 n=312 local dev.=2.0724
10 K outliers=5
obs−calc Tb, K
scan angle, deg
10
8
6
4
2
0
−2
−4
−6
−8
−10
−50
−40
−30
−20
−10
0
10
20
30
40
50